

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



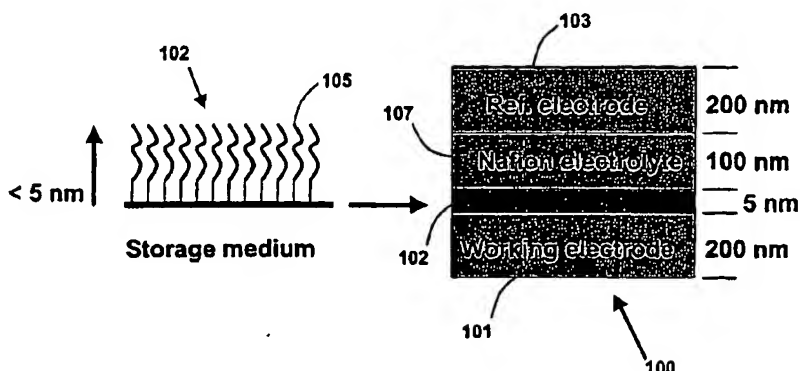
(43) International Publication Date  
11 January 2001 (11.01.2001)

PCT

(10) International Publication Number  
**WO 01/03126 A2**

- (51) International Patent Classification<sup>7</sup>: **G11B** 2824-102 Avent Ferry Road, Raleigh, NC 27606 (US).  
**GRYKO, Daniel, Tomasz** [PL/US]; 3117-b Aileen Drive, Raleigh, NC 27606 (US).
- (21) International Application Number: **PCT/US00/17847**
- (22) International Filing Date: **28 June 2000 (28.06.2000)** (74) Agents: **HUNTER, Tom et al.**; Skjerven, Morrill, MacPherson, Franklin & Friel LLP, 25 Metro Drive, Suite 700, San Jose, CA 95110 (US).
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:  
09/346,221 1 July 1999 (01.07.1999) US  
09/346,228 1 July 1999 (01.07.1999) US  
09/484,394 14 January 2000 (14.01.2000) US
- (71) Applicants (for all designated States except US): **THE REGENTS OF THE UNIVERSITY OF CALIFORNIA** [US/US]; 745 Parnassus Avenue, Box 1209, San Francisco, CA 94143-1209 (US). **NORTH CAROLINA STATE UNIVERSITY** [US/US]; One Holladay Hall, Raleigh, NC 27695 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **BOCIAN, David, F.** [US/US]; 6308 Glen Air Avenue, Riverside, CA 92506 (US). **KUHR, Werner, G.** [US/US]; 7075 Coriander Drive, Oak Hills, CA 92345 (US). **LINDSEY, Jonathan, S.** [US/US]; 3300-301 Cotton Mill Drive, Raleigh, NC 27612 (US). **CLAUSEN, Peter, Christian** [DE/US];
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— Without international search report and to be republished upon receipt of that report.
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **HIGH DENSITY NON-VOLATILE MEMORY DEVICE**



(57) Abstract: This invention provides novel high density memory devices that are electrically addressable permitting effective reading and writing, that provide a high memory density (e.g.,  $10^{15}$  bits/cm<sup>2</sup>), that provide a high degree of fault tolerance, and that are amenable to efficient chemical synthesis and chip fabrication. The devices are intrinsically latchable, defect tolerant, and support destructive or non-destructive read cycles. In a preferred embodiment, the device comprises a fixed electrode electrically coupled to a storage medium having a multiplicity of different and distinguishable oxidation states wherein data is stored in said oxidation states by the addition or withdrawal of one or more electrons from said storage medium via the electrically coupled electrode.

WO 01/03126 A2